liam Thompson thinks any considerable change of ellipticity in geological ages impossible. G. H. Darwin thinks the diminution of ellipticity in recent times not impossible.[1] Fisher, Dutton and others[2] considering the matter from different standpoints, declare against any considerable amount of contraction since the formation of the first crust. Mallet has estimated it at probably as great a figure as any one.

(2.) A more careful noting of the height of marine terraces in all parts of the world, and an accurate determining of their relative ages, as indicated by their fossils and degree of preservation. The common remark, "containing recent shells," is of little value.

(3.) A more careful study of the geological formations in tropical regions, and an especial noting of any signs of their alternating with similar formations outside. This, probably, may as readily be told, as in any way, by the comparative development of their forms of life.

(4.) A special study of the areas occupying the neutral ground, to discover, if possible, the over-lapping of formations, alternately from the higher and lower latitudes. Such areas should be chosen as have been as little disturbed by local causes as any. Those presumably the more favorable are Texas and Eastern Mexico. The Pampas and Australia. India, North and South Africa, are less favorable, at least, for the recent formations. The great variability of the neutral belts should be remembered, and the consequent extensive overlapping of strata. These areas may be found especially instructive, not only in determining the succession of strata, but in filling up the gaps in the series, both in the geological strata and the forms of life.

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## ON THE BITE OF THE NORTH AMERICAN CORAL SNAKES (GENUS ELAPS).[3]

BY FREDERICK W. TRUE.

1. The facts presented below indicate clearly, I believe, that the North American coral snakes possess the poisonous characteristics of the family to a considerable degree, rendering their

[1] Vid. Nature, Jan. 5th, 1882.

[2] Vid. Fisher's Physics of the Earth's Crust, p. 75.

[3] Read before the Biological Society of Washington, Oct. 13, 1882.

bite dangerous or fatal in its effects. The somewhat general notion that they are harmless is erroneous. Incidentally it appears that the popular belief that certain serpents sting with their tail extends to the coral snakes.

2. On the afternoon of June 1, 1882, Mr. William Shindler, artist in the U. S. National Museum, was bitten in the index finger of the left hand by a specimen of coral snake, *Elaps fulvius*, received from Gainesville, Florida, which he had placed in his room that he might sketch it. The wound was inflicted between 2 and 3 o'clock, P. M. The serpent had not been fed for two months previously. It clung so firmly to the finger that it had to be pulled off. The first symptoms, which appeared immediately after the bite, consisted of violent pain at the wound, and extending up the arm to the left breast. The wound was cauterized by Dr. J. M. Flint. The symptoms continued without material change to half past four in the afternoon. At that hour, according to Mr. Shindler, the first symptoms of drowsiness or unconsciousness made their appearance, and remained until the morning of the 3d inst.

At 7.30 P. M. on the day of the bite, Mr. Shindler felt so ill that he deemed it prudent to call upon his physician, Dr. L. M. Taylor, of Washington. Dr. Taylor has kindly furnished me with a summary of the symptoms which he observed from the time the case came into his hands at the hour stated, until signs of recovery appeared, and of the treatment employed. The notes are as follows:

June 1, 1882. Case of William Shindler. Bite of coral snake; index finger, left hand.

*Symptoms.*—Finger swollen. Complains of acute pain extending up arm and down to region of heart. Partial delirium. Pulse at wrist of injured hand almost imperceptible; on other side weak, irregular, compressible. Skin cool, clammy. Tongue tremulous, cool, *white*. Nervous, excitable, garrulous. Eyes dull, stupid in expression; pupils contracted. Jactation, nausea, persistent vomiting.

*Treatment.*—Saturated bandage with strong ammonia water, and applied to wound.

*Prescription.*—Bicarbonate of soda.....4 drachms.
Sub-nitrate of bismuth.....1 "
Water sufficient to dissolve soda. Teaspoonful every five minutes. Administered six doses.

*Symptoms.*—Nausea returned; vomiting ceased.

*Prescription.*—Aromatic spirits of ammonia.....1 ounce.
French brandy.....3 "
Teaspoonful every five minutes until six or eight doses had been given. Left patient comfortable. Tablespoonful every hour during the night.

June 2, 8 A. M. *Symptoms.*—Patient free from pain, pulse feeble, regular, still weaker on injured side. General condition much improved. Recovery certain.

Continue use of recipe every two or three hours.

In three days after treatment the patient felt in good health again. About two months after the event, however, pain set in once more at the bitten finger, extending to the knuckles, and after a few days an ulcer made its appearance above the latter.

At this date Mr. Shindler informs me that he is in good health, but that pain is felt from time to time in the bitten finger.

3. Desirous of learning whether cases like the preceding were common, I called upon Dr. Taylor, who referred me to several physicians in Texas. I received extended communications from Dr. Thomas Kearney and Dr. J. Herff, of San Antonio, which I append. I also caused search for parallel cases to be made in the catalogues of the library of the Surgeon-General's office, to which I gained access through the kindness of Dr. Robert Fletcher. The search proved fruitless, showing that few or no such cases have been hitherto recorded.

The following letter of Dr. Kearney, mentioned above, gives information of some cases of coral snake bite occurring in Texas, as well as allusions to the popular belief in serpent's stings and the treatment of rattlesnake bite:

SAN ANTONIO, TEXAS, *July 10, 1882.*

*Mr. Fredk. W. True, National Museum, Washington. D. C.*

DEAR SIR:—Your letter of June 19th, was received last evening on my return to this city. You wish me to give you whatever information I possess relative to the effects of the bite of the coral snake, treatment, &c., and whether any of such wounds have come under my immediate notice. In reply I must say that I have never seen or treated a case of coral snake bite. The snake is classed here as among the poisonous reptiles, and its bite is considered about as fatal as the bite of the rattlesnake. They are seldom met with in this portion of Texas. During my long residence in this State and in Mexico bordering on the Rio Grande, a period of nearly thirty years, I may have seen one or two dozen, and most of these, with few exceptions, I have met with in shady nooks or in thickly shaded thickets, out of which they seldom venture. This perhaps is one cause why they are not so often met with as the rattlesnake, whose habits lead him to seek open glades and prairies where he can enjoy his sunshine bath. From all the information that I have received as to the character of the coral snake, I have no doubt as to its poisonous nature, and it is the common belief among the people, that like the scorpion he is armed with a sting in his tail.

The following case of a bite of a coral snake, followed by death, occurred near Corpus Christi, Texas, during the last year of the "late unpleasantness." An infant child of Mr. Alexander Stringer was playing in the yard, and being attracted by the bright colors of a coral snake, grasped it near the middle. The screams of the child brought its parents to its relief, but too late, the snake had done its work. The

child lingered in great agony until the following morning and died as above stated. The snake, as described to me, was about eighteen inches long, and it is a matter of doubt with me whether the bite of so small a snake would have proved fatal to an adult. The year following this unfortunate occurrence I became a resident of Corpus Christi, and resided for several years within a hundred yards of Mr. Stringer, and he, as also many of the citizens, often told me of the sufferings and death of that child, and I will here add, that Stringer always contended that the snake did not bite the child, but inflicted the fatal wounds with the sting of its tail, and in this opinion he was not alone. About two years after this I was on a visit to my friend, Capt. R. King, the proprietor of a great stock ranch, Santa Gertrudes, forty miles from Corpus Christi. Walking across the court-yard one evening in company with Mr. R. Holbien, the book-keeper, I saw in the grass a small coral snake of sixteen or eighteen inches in length; I commenced annoying it with my cane to satisfy myself as to whether it had a sting or not; Holbien remarked, "be careful, that is the same kind of a snake that killed Stringer's child." Holbien was living in Corpus Christi when the child died. I pinned the snake to the ground with my cane, but could not induce Holbien to make close examination, he was afraid of it. My eyesight was very defective. I called Mr. Greer, the superintendent of the ranch, who happened to be passing at the time, and requested him to notice closely as to whether he could see a sting or not; he assured me he could see the sting very plainly whenever I pressed upon the snake sufficiently hard to cause it to strike with its tail. The motions of its tail indicated that it was used as a means of defence, whether it had a sting or not. I killed the snake and cut off an inch or more of its tail. The following morning I examined it as closely as I could; I found the terminal tip was constituted of bone of extreme hardness—almost flinty, in dividing it I had to force the knife through with a hammer. I found in the center a dark substance about the size of a hog-bristle attached only at its upper part, about one-half an inch from the apex of the tail. This limited examination gave me no satisfactory results, as my sight was defective and I had no magnifying glass to aid me; and notwithstanding Mr. Greer's assertion that he had seen the sting, I came to the conclusion that the black, thread-like matter I had noticed in the center of the bony case was probably the caudal terminus of the spinal cord. Since then no opportunity has presented itself to me for further investigation. I believe I have now given you all the information I possess relative to the coral snake, and regret that it is out of my power to give you anything more satisfactory. I will add that the coral snake, as met with in Southwestern Texas and in Mexico bordering on the Lower Rio Grande, seldom exceeds thirty inches in length; all that I have seen, with few exceptions, ranged in length from twelve inches to twenty-four.

In the treatment of the bite of the coral snake, I would adopt the same course of treatment as in case of the rattlesnake bite or that of any other poisonous reptile. I have noticed the same train of symptoms follow the sting and bite of the centipede, the bite of a diminutive spider found occasionally here and in Mexico, which is followed by an alarming train of symptoms if not soon arrested, and the bite of the copperhead, moccasin and rattlesnake. I have seen an infant die in ten hours after being stung by a centipede, but have never heard of a death of an adult from the same cause, though I have had many come under my notice. When my attention has been called in time, I have never failed to cure a snake bite (rattlesnake) with Bibron's mixture, bandaging the limb above the wound, scarifying freely, and bathing it for several hours with tincture of iodine, alcoholic stimulants being freely administered when the temperature and pulse indicated its use.

I have treated cases successfully when no other antidote was at hand, by giving internally and externally tincture of iodine, and using whisky, *ad libitum*, to keep up temperature and pulse.

Remedies to be successful in such cases must be applied very soon after the wound is received. When delayed too long the vital forces sink rapidly, and when the patient ceases to complain of pain, death is close at hand.

Very respectfully, your obedient servant,

THOMAS KEARNEY.

Dr. Herff's letter contains information of two additional cases, one proving fatal, the other having the most serious consequences. He writes as following:

I know two cases where persons were bitten in the finger, where the back-teeth of the serpent could come into action, and one died in twenty-four hours, while the other one recovered after an almost fatal prostration of thirty-six hour's duration.

Different from our common poisonous snakes the bitten part would neither swell nor become discolored, but the poison acted more as the poison of the sea-serpents (hydrophis and platurus) is described to act. For sometime nothing is felt but a glowing heat over the body, which is soon followed by total prostration, very small and slow pulse and absolute suppression of urine. The fatal case I know of came under my observation a few minutes before death occurred under the symptoms of paralysis of the heart. The second case was brought soon enough for me to try stimulants, whisky, hypodermic injections of ammonia and fomentations of digitalis leaves over the region of the kidneys. The man, a strong young Scotchman, recovered in three days and felt only a feeling of tingling in his extremities for some time after.

In neither case unconsciousness, vomiting, or bleeding from nose or mouth occurred, nor could anything be observed on the wound, except the small impression caused by the teeth of the serpent. Both men kept the snakes as pets and the last one used to put his finger in the animal's mouth very often to show how tame he was. One day he put it in a little deeper than usual and while trying to extricate it the teeth bit him.

I may add that before I had these experiences I used to handle snakes of that species myself frequently and had no hesitation to catch them with my hands, although I never tried the experiment for which the poor Scotchman paid so dearly. Different from other snakes, it does not try to bite, but when you handle it winds around your hand with considerable force and for such a thin animal with a very firm grip.

4. A recent letter from Mr. James Beel, of Gainesville, Florida, to Professor Baird, and by him kindly transmitted to me, contains some matters of interest relative to coral snake bites. I quote from it as follows:

"I have known for some time that the coral snake was poisonous, quite as much so as the rattlesnake, but I did not know but what there were two kinds, one poisonous and the other not. A gentleman and a little child were killed in West Florida, where I formerly lived, by snakes bite, and, 'tis said, by this kind of snake. The poison, however, was not so rapid in its effects. I once put a grass snake and one of these coral snakes into a large glass pickle-jar, and the coral snake bit the other, which died in a few minutes thereafter. Mrs. Bell was watching them at the time, and thinks it did not live over five minutes after being bitten. I have tried fre-

quently to get them to bite or to find their fangs, but have never succeeded, although I did not examine very closely."

Mr. Shindler informs me that he tried a similar experiment with the snake which wounded him, with a like result.

Mr. Swartz, of Washington, related to me another case which occurred in Crescent City, Florida, in which the poison did not seems of a very virulent nature, the bad effects yielding readily to such remedies as the person bitten was able to apply.

5. That coral snake bites are of quite rare occurrence seems due (1) to the lack of abundance of these serpents, especially about towns; (2) to their sluggish disposition, and (3), as Duméril has remarked, to the small size of the mouth, which prevents them from fastening upon any but a sharply curved surface. Elapsoid serpents are not so little obnoxious in all countries as in North America. They are the scourge of India.

6. Numerous writers of the first half of the present century, and later authors as well, refer to the habits and characteristics of the North American and smaller South American coral snakes.[1] The majority, while alluding to their close relations to the very venomous sections of the family *Elapidæ*, regard them as the innocent members of the group.

7. I am indebted to Mr. Shindler for permission to publish the case in which he was the principal; to Dr. Taylor for the medical summary of the same; and to Dr. Kearney, Dr. J. Herff and Mr. Schwartz for information of the other cases cited. Also in an especial manner to Professor Baird, and indirectly to Mr. Bell, for the use of the communication of the latter observer.

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## ACHENIAL HAIRS AND FIBERS OF COMPOSITÆ.

BY PROFESSOR G. MACLOSKIE.

THE large order of Composite plants has so much unity of structure, that characters scarcely of specific value elsewhere, are here used for the separation of genera and for limiting sub-orders. Any attempt towards the discovery of additional tribal characteristics is therefore excusable. I have been examining the surface of the achenes, the hairs growing from them and their internal structure, and have found characters scarcely noticed by previous

[1] Duméril and Bibron: Erpétologie générale. Holbrook: North American Herpetology, iii, 1842, pp. 50–51. Jordan: Manual of the Vertebrates, 1878, p. 183.